SN: 043-0028

Bridge Condition Report

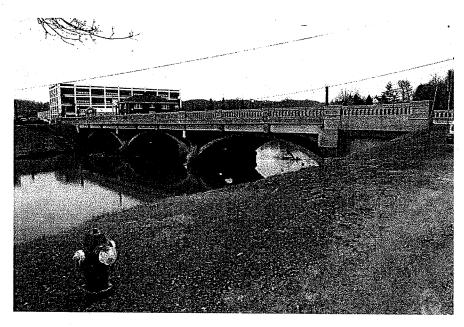
DISTRICT: 2

ROUTE: F.A. ROUTE 18 (IL. 84)

SECTION: 103-D-BR

COUNTY: JODAVIESS

STRUCTURE NUMBER: 043-0028



LOCATION: WITHIN HANOVER

PREPARED BY: Rich Mardauss

DATE PREPARED: December 4, 2008

PROPOSED LETTING DATE:

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I. Geographical & Administrative Data:

Structure Number:

043-0028

County:

JoDaviess

Route Carried:

IL. 84

Feature Crossed:

Apple River

Section:

103-D-BR

Station:

259+08.20

Roadway Classification:

Design/Posted Speed:

30/30 MPH

ADT (current/design):

3300/4750 264/380

ADTT (current/design):

DHV: **Inventory Rating HS:** 330

12.1

Operating Rating HS:

25.0

Sufficiency Rating:

23.4

Construction / Reconstruction / Repair History

The original bridge, which was a three span spandrel arch, was built in 1933 as SBI 80, Section 103-D. It was 209.66 feet long from back to back of the abutments and 38 feet wide out to out. The deck accommodated two, 12 foot wide traffic lanes and two 6 foot wide sidewalks.

In 1983, the structure was rehabilitated as FA 18, Section 103-D-BR. Under this contract, the concrete deck was removed, the abutment and pier caps were widened, and PPC box beams were set in place to form a new and wider superstructure. Even though all external loads were removed from the arches during reconstruction, all six arches were left in place for aesthetic effect.

In 1990 the bituminous wearing surface was removed and replaced with a 5 inch thick concrete overlay. In addition, neoprene expansion joints were installed over all four substructure units. This work was included within resurfacing contract FA 18, Section 104RS-3.

11. Physical Description of Structure:

The superstructure of this 3 span bridge is composed of PPC deck beams. All three spans are simply supported, and each span is approximately 69 feet long. The out to out width of the deck is 43.83 feet which includes two 15 foot wide traffic lanes, two 5.92 foot wide sidewalks, and two 1 foot wide parapets. The bridge has no skew, and its centerline is a straight line which is tangent to the 1.66 degree horizontal curve which defines the centerline of IL. 84. This curve is relatively flat with respect to the structure. If a chord line is drawn from abutment to abutment at points where the striping curve intersects the backs of the abutments, the chord offset at the center of the bridge is only 1.65 feet.

The abutments and both piers are built on spread footings keyed into rock. The piers are solid from bedrock to the bottoms of the arches, and the abutments are closed with 36 foot long curtain walls.

The bridge deck slopes from north to south at an imperceptible rate of .04%. The only utility on the bridge is an electrical line for the ornate lamp posts.

III. Field Inspection & Physical Evaluation:

Superstructure:

Deck: There are no spalls or delaminations in the concrete wearing surface, but reflective cracking has occurred over 11 of the 13 keyways.

P/S Box Beams: The entire soffit (8800 square feet) was sounded and 10 spalls (totaling 6.25 square feet) were found. Although no tendons are exposed, and stirrup exposure totals less than one tenth of one percent of the entire soffit area, the superstructure has to be rated 4 by current rating criteria. See the graphics in the latest damage inspection for spall dimensions and locations.

Substructure:

Abutments: Both abutments are in good condition. According to the latest PONTIS inspection, only one percent of the total abutment area is unsound.

Piers: Both piers are also in good condition, and there is no bar exposure anywhere. Seven percent of the total pier surface area is unsound due to superficial scaling.

Inspection History (NBIS Ratings):

Year	Deck	Super	Sub
2008	4	4	6
2007	4	4	6
2006	6	4	6
2005	6	6	6

IV. Potential Scope of Work Determination & Analysis:

Option 1: Remove the existing superstructure and replace it in kind.

There is 40 inches of clearance between the existing PGL and the tops of the original concrete arches. The current superstructure is 38 inches deep, and the bottoms of the deck beams barely clear the arches. Ideally we would like to maintain the existing grade line to minimize conflict with adjacent properties. Also, we should attempt to utilize the existing substructure in its entirety without modification. Option 1 satisfies both conditions because the existing and proposed cross sections are identical.

Option 2: Remove the existing superstructure and replace it with a multi beam, continuous steel superstructure with a conventional cast in place deck.

If a steel superstructure is built on the existing substructure extensive substructure reconstruction will be required. It may be possible to maintain the current PGL and clear the tops of the old arches if 27 inch deep steel beams are used, but clearance between the beam bottoms and arches will be approximately 2 inches assuming deck fillets are no greater than 1 inch thick. If beam clearance can't be achieved the 6 arches will have to be removed. Each arch weighs 86 tons and removal would have to be done without damaging or destabilizing the piers or abutments.

Option 3: Completely replace the entire structure.

The difference in elevation between the low point of the existing PGL and the water elevation for the 500 year flood is 9.7 feet, so freeboard would not be a concern in the design of a replacement structure. A new two span bridge could be built with a construction depth of up to 7 ft. and still clear the water level of this extreme event by over two feet.

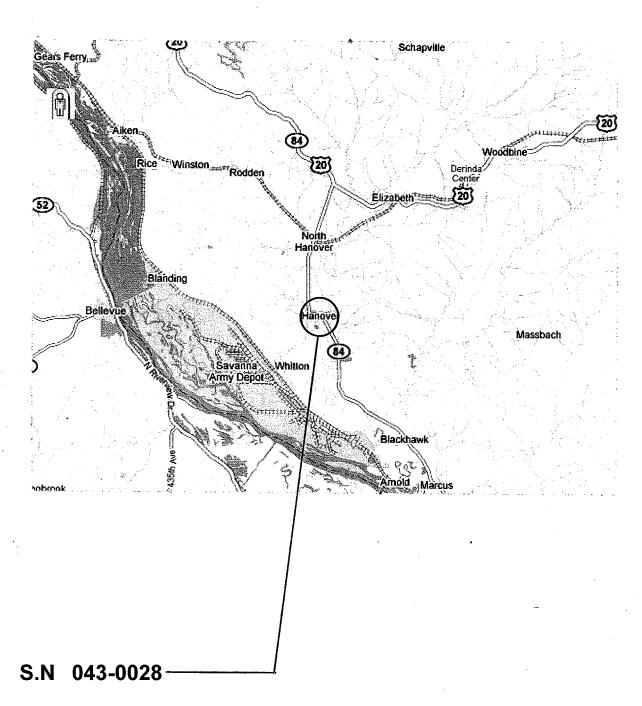
V. <u>Discussion and Recommended Scope of Work:</u>

Complete replacement is the recommended option.

The cost of Option 1 was estimated to be 56% of the cost of a new bridge, but this option was rejected because experience has shown us that deck beam bridges have become very expensive to maintain compared to multi beam bridges with conventional decks. As an example, structure 037-0129 was selected for a cost comparison between these two superstructure types. Structure 037-0129 was built as an entirely new deck beam bridge in 1980. Unit prices for individual pay items were reviewed for that contract, and only items directly related to the construction of the bridge were totaled to get a price per square foot cost. This cost was \$67 in 1980 dollars, and according to the consumer price index, a 1980 dollar would be worth \$2.52 right now. That original \$67 translates to \$168 today. This year we had to replace all of the original beams (contract 64D10) at a current cost of \$63 per square foot. That totals to \$231 per square foot for 28 years of service. The cost of new bridges is currently averaging \$125 to \$145 per square foot of deck surface area.

Option 2 was also rejected. The cost of this option is 82% of the cost of an entirely new structure, and this assumes a new superstructure could be built within the 40 inch gap between the PGL and the tops of the old arches. With option 2 a new superstructure would be built over a 75 year old substructure with nonfunctional arches that restrict inspection access and piers with scaling cover concrete.

LOCATION MAP



Attachment A.

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Structures Information Management System Illinois Department of Transportation Master Structure Report (S-107)

District: Structure Number: 043-0028

Railroad Crossing Info 1 LOAD FACTOR Number Culvert Cells: O Culvert Opening Area: Navigation Horiz Clear **AASHTO Bridge Length** Navigation Vert Clear: **Bridge Roadway Width** 0 Culvert Cell Height: Culvert Cell Width: Appr Roadway Width: Sidewalk Width Right: Culvert Fill Depth: Length of Long Span: 00 D 00 M 00 S Navigation Control: Sidewalk Width Left: Structure Length: RR Vertical Underclear: RR Lateral Underclear: Deck Width: Crossing 1 Nbr: Crossing 1 Nbr: Rate Method: None ž 23.4 Yes 043-0080 07/17/2008 None Ž 0000-000 Bdr State % Responsibility: 12.1 (222) Load Rating Date: 07/13/2007 25.0 (245) Multi-Level Structure Nbr: Substructure Material: Border Bridge State: Structural Steel Wt: Historical Significance: Sufficiency Rating: Last Update Date: Parallel Structure: Bdr State SN: Structure Flared: HBRRP Eligible: Skew Direction: Skew Angle: Replaced By: 2 IDOT Replaces: Rated By 33.0 / 05 BOX BEAM OR GIRDER-MULTIPLE Inventory Data 02 HS20 Operating Rating: Inventory Rating: Deck Structure Thickness: IN HANOVER Design Load: 5 WATERWAY 04/1988 HANOVER Bridge Name: 6.55 S ව Location: StatusDate: Maint Township: I.D.O.T. - BUREAU OF MAINTENANCE 17 M 0 None **ם** PCAST PRES CN DK BM Nbr Of Approach Spans: PRESTRESS CONCRETE OPEN - NO RESTRICT 29.80 S Longitude: 0 None None 043 JODAVIESS APPLE RIVER HIGHWAY 1.D.O.T Ft. / 0 No Toll None ILL RT 84 Sidewalks Under Structure: Latitude: 42 D 15 M Toll Facility Indicator: Main Span Matl/Type: Deck Structure Type: Maint Responsibility: Median Width/Type: Nbr Of Main Spans: Guardrail Type L/R: Near #2 Matl/Type: Service On/Under: Reporting Agency: Near #1 Matl/Type: ***Approaches*** Far #2 Matl/Type: **Bridge Remarks:** Far #1 Matl/Type: Feature Crossed Status Remarks: Facility Carried: Bridge Status: Maint County:

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Key Route On Data	Key Route Nbr: FEDERAL-AID PRIMARY 030	Main Route 00.000	Inventory County: 043 JODAVIESS	Township/Road Dist 09 HANOVER	2440 HANOVER	None	Functional Class: 30 OTHER PRINCIPAL ARTERIAL	** CLEARANCES ** South/East North/West	036.0	041.8	99 Ft 11 In 00 Ft 00 In	99 Ft 11 In 00 Ft 00 In		*** Marked Route On Data ***	Designation	1 Mainline		
	Key Route Nbr: F	Appurtenances Main Route	Inventory County:	Township/Road D	Municipality	Urban Area:	Functional Class:	** CLEARANCES *	Max Rdwy Width:	Horizontal:	Min Vertical:	10 Ft Vertical:	Lateral:			Route #1: 1	Route #2:	Route #3:



Bridge Inspection Report (SI)

Structure Number: 043-0028 **Location & Inventory Information** Maint. Co: JODAVIESS **HANOVER** Twsp: Status: **OPEN - NO RESTRICT** Facility Carried: ILL RT 84 Feature Crossed: APPLE RIVER Team/Sub Section IN HANOVER Location: Municipality: **HANOVER** 242 / 084 Total # Spans: 3 Material: PRESTRESS CONCRETE Type: BOX BEAM OR GIRDER-MULTIPLE Inspection Intervals (Mo.): Routine NBIS 12 / Fracture Critical 0 / Underwater - 0 90 - Inspection Date: 90C - Temp. (°F): 93C - Special Inspection Date: 90A – Inspection Team Leader: Qualification: Inspector's Appraisals Prev New Prev New 58 - Deck Condition: 62 - Culvert Condition: \mathbf{Q} 72 - Approach Rdwy Align: N 59 - Superstructure Cond: 61 - Channel Condition: 7 111 – Pier Navig Protection: N 60 - Substructure Cond: Appraisal 6 71 – Waterway Adequacy: 0 **Additional Inspection Data** Prev New 36A – Bridge Railing Adequacy: Prev Prev New Prev New Approach Guardrail Adequacy: 36B – Transitions: 36C - Guardrail: 36D - Ends: Railing Comments: Prev Prev 108A – Wearing Surface Type: 108B – Type of Membrane: 3 108C – Deck Protection: Deck 108D - Total Deck Thickness (In.): 39.0 Comments: Prev New 59A - Paint Date (Mo/Yr): Paint 1 Comments: 59B - Paint Systems: Color: Fascia – ; Inter. – ; Railing – 59C - Utilities Attached: Utilities 9NN Comments: Prev New 70A2 - Single Unit Vehicles: Т. New Weight Limit Posting: Combination Vehicles: 70B2 – 3 or 4 Axles: 70C2 – 5 or More Axles: Τ. Postina 70D2 - One Truck at a Time: (Note: 237 characters maximum) 90B – Inspection Remarks: Previous Inspection VISUAL INSPECTION FROM GROUND AS INSTRUCTED, WILL USE UB30 NEXT INSPECTION/SPRIING, NO BEAMS SAGGING, TREE STUCK IN SPAN 1 ON TOP OF ARCH, PIERS FOUNDED ON ROCK. New Inspection Signature Date Supervisor Init. & Date Inspection Team Leader:



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